

TDRWP Certification Plan for DOLILU

BJ Barbré
Jacobs ESSSA Group
MSFC Natural Environments
29 March 2017

Presentation to the Natural Environments Day-of-Launch Working Group

Purpose

- Show the requirements and analyses needed to certify the KSC Tropospheric Doppler Radar Wind Profiler (TDRWP) to make GO decisions for Exploration Systems Development (ESD) launches.
- Scope: Certify that the TDRWP provides data of sufficient accuracy and resolution; and that the instrument provides enough reliability to support Day of Launch I-Load Update (DOLILU) operations.

Certification Requirements

Requirement	Criteria	Rationale
Time Interval	5 min	Supports DOL timeline.
Vertical Data Interval	150 m	Consistent with database used for SLS design.
Altitude	2,700 - 15,250 m	Consistent with database used in SLS design.
Wind Accuracy	1.5 m/s root-mean-square component difference	Accuracy of heritage balloon and DRWP systems.
Reliability	Usable profiles available for at least x% of possible collection timestamps	No more than N consecutive minutes of missing data in a six-hour period to support DOL assessments.
Effective Vertical Resolution	700 m	Based on maximum wavelength of gust analyses during SLS design.
Data Collection Period	One year	Analyzing available data over one year of continuous operation produces statistically significant results over all seasons.

Analyses

- Repeat methodology used for the TDRWP Operational Acceptance Test (OAT) [1].
 - Data examination verified time interval, vertical data interval, and altitude.
 - Concurrent TDRWP and balloon profile comparisons verified wind accuracy.
 - Spectral analysis verified effective vertical resolution.
- Reliability
 - Rationale statement: No more than N consecutive minutes of missing data in a six-hour period to support DOL assessments.
 - A data gap of no more than N consecutive minutes can be overcome to meet DOLILU timeline.
 - Percentage of allowable available data: $1.0 - (N / 360 \text{ minutes})$.

[1] Barbre, BJ. Results of the Kennedy Space Center Tropospheric Doppler Radar Wind Profiler Operational Acceptance Test. Jacobs ESSSA Group. MSFC Natural Environments. Report No. ESSSA-FY16-3075. October, 2016.

Forward Work

- Conduct and document analyses using data collected over the appropriate period (currently late June, 2017).
- Report to be completed in late 2017.